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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

**JUNIE EKSAMEN
GRAAD 12**

2024

NASIENRIGLYNE

WISKUNDE

(VRAESTEL 1)

12 bladsye

LET WEL:

Lees die volgende instruksies aandagtig deur voordat die vrae beantwoord word.

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag DOODTREK en nie oordoen nie, sien die deurgetrekte poging na.
- Konsekwente akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas.
- Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat NIE.

VRAAG 1

1.1	1.1.1	$2x(3x + 4) = 0$ $x = 0$ of $x = -\frac{4}{3}$	$\checkmark x = 0$ $\checkmark x = -\frac{4}{3}$	(2)
	1.1.2	$2x^2 - 4x + 1 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(1)}}{(2)(2)}$ $x = \frac{4 \pm \sqrt{8}}{4}$ $x = 1,71$ of $x = 0,29$	$\checkmark$ standaardvorm $\checkmark$ vervang in korrekte formule $\checkmark x = 1,17$ $\checkmark x = 0,29$	(4)
	1.1.3	$(x - 2)^2 \geq 1$ $x^2 - 4x + 4 \geq 1$ $x^2 - 4x + 3 \geq 0$ $(x - 3)(x - 1) \geq 0$ $CV x = 3$ of $x = 1$ $x \leq 1$ of $x \geq 3$ OR $(x - 2) \leq -1$ or $(x - 2) \geq 1$ $x \leq -1 + 2$ or $x \geq 1 + 2$ $x \leq 1$ or $x \geq 3$	$\checkmark$ standaardvorm $\checkmark$ faktore $\checkmark$ kritiese waardes $\checkmark$ antwoord $\checkmark\checkmark$ korrekte ongelykhede $\checkmark$ vereenvoudig $\checkmark$ Antwoord	(4)
1.2	1.2.1	$\sqrt{x - 2} = 4 - x$ $x - 2 \geq 0$ en $4 - x \geq 0$ $x \geq 2$ en $x \leq 4$ $2 \leq x \leq 4$	$\checkmark x - 2 \geq 0$ $\checkmark 4 - x \geq 0$	(2)
	1.2.2	$\sqrt{x - 2} = 4 - x$ $x - 2 = 16 - 8x + x^2$ $x^2 - 9x + 18 = 0$ $(x - 6)(x - 3) = 0$ $x \neq 6$ of $x = 3$	$\checkmark$ kwadreer albei kante $\checkmark$ standaardvorm $\checkmark$ faktore $\checkmark$ kies $x = 3$	(4)

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1.3	$3x + y = 2$ en $y^2 = 2x^2 - 1$ Vgl $1.y = 2 - 3x$ $(2 - 3x)^2 = 2x^2 - 1$ $4 - 12x + 9x^2 = 2x^2 - 1$ $7x^2 - 12x + 5 = 0$ $(7x - 5)(x - 1) = 0$ $x = \frac{5}{7}$ or $x = 1$ $y = -\frac{1}{7}$ of $y = -1$ OF Vergelyking 1 $x = \frac{2-y}{3}$ $y^2 = 2 \left(\frac{2-y}{3} \right)^2 - 1$ $y^2 = 2 \left(\frac{4 - 4y + y^2}{9} \right) - 1$ $9y^2 = 8 - 8y + 2y^2 - 9$ $7y^2 + 8y + 1 = 0$ $(7y + 1)(y + 1) = 0$ $y = -\frac{1}{7}$ or $y = -1$ $x = \frac{5}{7}$ or $x = 1$	✓ onderwerp van vergelykings ✓ substitusie ✓ standaardvorm ✓ faktore ✓ x-waardes ✓ y-waardes ✓ expanding T_{n-1} ✓ value of a ✓ value of b ✓ value of c ✓ value of T_1
1.4	$r + 2s = a$ $r + 2s = a$ $\frac{r - 2s = b}{2r = a + b}$ $\frac{r - 2s = b}{4s = a - b}$ $r = \frac{a+b}{2}$ $s = \frac{a-b}{4}$ $rs = \frac{a^2 - b^2}{8}$ OF $\text{RHS} = \frac{a^2 - b^2}{8}$ $= \frac{(r + 2s)^2 - (r - 2s)^2}{8}$ $= \frac{(r^2 + 4rs + 4s^2) - (r^2 - 4rs + 4s^2)}{8}$ $= \frac{8rs}{8}$ $= rs$	✓ $2r = a + b$ ✓ $4s = a - b$ ✓ r en s onderwerp van vergelyking ✓ vermenigvuldiging OF ✓ vervanging van a en b ✓ uitbrei ✓ vereenvoudig

(6)

(4)

[26]

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VRAAG 2

2.1	2.1.1	$85 ; 82 ; 79 ; 76$ $a = 85 \quad d = -3$ $T_n = a + (n - 1)d$ $T_n = 85 + (n - 1)(-3)$ $T_n = 85 - 3n + 3$ $T_n = 88 - 3n$	✓ d waarde ✓ vervang a en d ✓ antwoord	(3)
	2.1.2	$T_n = 88 - 3n < 0$ $-3n < -88$ $n > \frac{88}{3}$ $\therefore T_{30}$ sal die eerste negatiewe getal wees.	✓ $88 - 3n < 0$ ✓ vereenvoudig ✓ antwoord Slegs antwoord vol punte	(3)
2.2		$T_n - T_{n-1} = 4n - 3$ $\therefore T_1 = 4(2) - 3 = 5 \quad T_2 = 4(3) - 3 = 9 \quad T_3 = 4(4) - 3 = 13$ Eerste verskil = 5 ; 9 ; 13 Tweede verskil = 4 ; 4 $2a = 4 \quad 3a + b = 5$ $a = 2 \quad 3(2) + b = 5$ $b = -1$ $T_{11} = 190$ $T_n = 2n^2 - 1n + c$ $190 = 2(11)^2 - 1(11) + c$ $190 = 242 - 11 + c$ $c = -41$ $T_n = 2n^2 - n - 41$ $T_1 = 2(1)^2 - (1) - 41 = -40$ OF $Tn = an^2 + bn + c$ $Tn - 1 = a(n - 1)^2 + b(n - 1) + c$ $Tn - Tn - 1 = an^2 + bn + c - [a(n^2 - 2n + 1) + bn - b + c]$ $= an^2 + bn + c - an^2 + 2an - a - bn + b - c$ $= 2an - a + b$ $2an - a + b = 4n - 3$	✓ eerste verskil ✓ waarde van a ✓ waarde van b ✓ waarde van c ✓ waarde van T_1	(5)

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	$2a = 4$ $a = 2$ $-a + b = -3$ $-2 + b = -3$ $b = -1$ $121(2) + 11(-1) + c = 190$ $c = -41$ $T_n = 2n^2 - n - 41$ $T_1 = 2(1)^2 - (1) - 41 = -40$	
2.3	$S_n = \frac{n}{2}[2a + (n-1)d]$ $1275 = \frac{50}{2}[2a + (50-1)d]$ $51 = [2a + 49d]$ $T_{25} + T_{26} = a + 24d + a + 25d$ $T_{25} + T_{26} = 2a + 49d$ $T_{25} + T_{26} = 51$	✓ vervang in formule ✓ uitbrei $T_{25} + T_{26}$ ✓ antwoord

(3)
[14]

VRAAG 3

3.1	$\sum_{k=1}^{\infty} (4x-1)^k$ $(4x-1)^1 + (4x-1)^2 + (4x-1)^3 \dots$ $r = (4x-1)$ $-1 < r < 1$ $-1 < 4x-1 < 1$ $0 < 4x < 2$ $0 < x < \frac{1}{2} \quad x \neq \frac{1}{4}$	✓ r ✓ toestand ✓ antwoord ✓ uitgesluit $x \neq \frac{1}{4}$
3.2	3.2.1 $T_1 = 3$ en $T_5 = 48$ $T_n = ar^{n-1}$ $48 = 3 \cdot r^4$ $16 = r^4$ $\therefore r = 2$	✓ sub in formule ✓ vereenvoudig ✓ antwoord
	3.2.2 Som van radiusse vir 5 sirkels $S_n = \frac{a(r^n - 1)}{r - 1}$ $S_5 = \frac{3(2^5 - 1)}{2 - 1} = 93$ eenhede $L = 93 \times 2 = 186$ eenhede OF	✓ sub in formule ✓ vereenvoudig ✓ antwoord

(3)

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		Som van deursnee vir 5 sirkels $S_5 = \frac{a(r^n - 1)}{r - 1}$ $S_5 = \frac{6(2^5 - 1)}{2}$ $S_5 = 186$ $L = 186 \text{ eenhede}$ OF $6 + 12 + 24 + 48 + 96 = 186$	
	3.2.3	$\pi 3^2 + \pi \cdot 6^2 + \pi \cdot 12^2 + \dots$ tot 10 terms $r = \frac{\pi \cdot 6^2}{\pi \cdot 3^2}$ $r = 4$ $S_{10} = \frac{9\pi(4^{10} - 1)}{4 - 1}$ $S_{10} = 3\pi(1\,048\,575)$ $S_{10} = 3\,145\,725\pi$	✓ opp van sirkel ✓ r waarde ✓ subt in formule ✓ antwoord
			(4)
			[16]

VRAAG 4			
4.1	$y = x + 1$ en $y = -x + 3$ $x + 1 = -x + 3$ $2x = 2$ $x = 1$ $y = 1 + 1$ $y = 2$ $p = -1$ $q = 2$	✓ $x + 1 = -x + 3$ ✓ x -waarde ✓ y -waarde	(3)
4.2	$y = \frac{-4}{x - 1} + 2$ $0 = \frac{-4}{x - 1} + 2$ $-2 = \frac{-4}{x - 1}$ $-2x + 2 = -4$ $-2x = -6$ $x = 3$	✓ $y = 0$ ✓ $x = 3$	(2)

4.3		✓ horisontale asimptoot ✓ vertikale asimptoot ✓ y-afsnit ✓ vorm	(4)
4.4	$x < 1$ of $x > 3$	✓ notasie ✓ kritiese waardes	(2)
[11]			

VRAAG 5

5.1	5.1.1	$f(x) = -(x - 2)^2 + 9$ $0 = -x^2 + 4x - 4 + 9$ $0 = x^2 - 4x - 5$ $(x - 5)(x + 1) = 0$ $x = 5$ of $x = -1$ $AC = 6$ eenhede OF $(x - 2)^2 = 9$ $x - 2 = \pm 3$ $x - 2 = 3$ of $x - 2 = -3$ $x = 5$ of $x = -1$ $AC = 6$ eenhede	✓ stel $y = 0$ ✓ standaardvorm ✓ xwaardes ✓ 6 eenhede OF ✓ stel $y = 0$ ✓ $(x - 2)^2 = 9$ ✓ x-waardes ✓ 6 eenhede	(4)
	5.1.2	$D(2:9)$ $y = b^x$ $9 = b^2$ $b = 3$	✓ sub in $g(x)$ ✓ $b = 3$	(2)
	5.1.3	$x \geq 2$	✓ antwoord	(1)
	5.1.4	$f(x) = -(x - 2)^2 + 9$ $y = -(x + 2 - 2)^2 + 9 - 9$ $y = -x^2$	✓ subst ✓ antwoord	(2)

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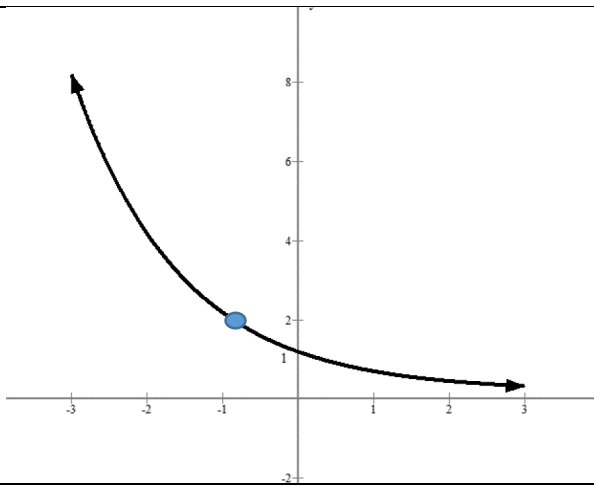
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	5.1.5	$x \leq 0$ of $x \geq 0$	✓ antwoord (A)	(1)
	5.1.6	Bewys: $g\left(x + \frac{1}{2}\right) = \sqrt{3}g(x)$ $g(x) = 3^x$ $g\left(x + \frac{1}{2}\right) = 3^{x+\frac{1}{2}}$ $= 3^x \cdot 3^{\frac{1}{2}}$ $= \sqrt{3}g(x)$	✓ vervang ✓ gebruik ekspon wet	(2)
5.2	$y = a(x - x_1)(x - x_2)$ $y = a(x + 3)(x - 2)$ $y = ax^2 + ax - 6a$ $y = mx + c$ $0 = m(-6) + c$ $0 = m(-6) - 6a$ $6a = -6m$ $a = -m$ OR $x = \frac{-3+2}{2} = -\frac{1}{2}$ $f'(x) = 2ax + b$ $0 = 2\left(-\frac{1}{2}\right)a + b$ $a = b$ $(-6; 0) (0; c)$ $m = \frac{c}{6}$ $c = 6m$ $0 = 4a + 2b + 6m$ $0 = 4a + 2a + 6m$ $-6a = 6m$ $a = -m$		✓ subt in formule ✓ vereenvoudig ✓ subt in formule ✓ subt c in formule ✓ $a = -m$	(5)
[17]				

VRAAG 6

6.1	$A(1:0)$	✓ $x = 1$	(1)
6.2	$x > 0$	✓ antwoord	(1)
6.3	$y = \log_{\frac{1}{2}} x$ $x = \log_{\frac{1}{2}} y$ $y = \left(\frac{1}{2}\right)^x$	✓ ruil x en y ✓ antwoord ANTWOORD ALLEEN VOLPUNTE	(2)

6.4		✓ vorm ✓ y-afsnit ✓ een ander punt	(3)
6.5	$y = \log_{\frac{1}{2}} x$ $y = \log_{\frac{1}{2}} \frac{1}{2}$ $y = 1$	✓ antwoord	(1)
6.6	Refleksie in die y-as en een eenheid na onder vertikaal	✓ refleksie in die y-as ✓ vertaal een af	(2)
[10]			

VRAAG 7

7.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$ $i_{eff} = \left(1 + \frac{0,075}{4}\right)^4 - 1$ $r = 7,71\%$	✓ sub in formule ✓ vereenvoudig ✓ antwoord	(3)
7.2	$A = P(1 - i)^n$ $4\,200 = 60\,000(1 - i)^{42}$ $\frac{4\,200}{60\,000} = (1 - i)^{42}$ $\sqrt[42]{\frac{4\,200}{60\,000}} = 1 - i$ $i = 1 - \sqrt[42]{\frac{4\,200}{60\,000}}$ $r = 6,14\%$	✓ n-waarde ✓ sub in formule ✓ vereenvoudig ✓ $r = 6,14\%$	(4)

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7.3	T0 T3 T10 27000 x 17614.76 $A = P \left(1 + \frac{i}{m} \right)^{n \times m}$ $17\,614,76 = P \left(1 + \frac{0,054}{12} \right)^{7 \times 12}$ $P = R12\,080,41$ $12\,080,41 + x = 27\,000 \left(1 + \frac{0,054}{12} \right)^{3 \times 12}$ $12\,080,41 + x = 31\,736,69$ $x = R19\,656,28$ OF $17\,614,76 = 27\,000 \left(1 + \frac{0,054}{12} \right)^{120} - x \left(1 + \frac{0,054}{12} \right)^{84}$ $x \left(1 + \frac{0,054}{12} \right)^{84} = 27\,000 \left(1 + \frac{0,054}{12} \right)^{120} - 17\,614,76$ $x = R19\,656,28$	✓ vervanging (3 jaar) ✓ antwoord ✓ vervangings ✓ vereenvoudig ✓ antwoord OF ✓ $i = \frac{0,054}{12}$ ✓ $n = 120$ ✓ $-x$ ✓ $n = 84$ ✓ answer
(5)		
[12]		

VRAAG 8 Penaliseer een punt vir notasie sleg in 8.1			
8.1	$f(x) = 2 - 3x^2$ $f(x+h) = 2 - 3(x+h)^2$ $f(x+h) = 2 - 3x^2 - 6xh - 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x-3h)}{h}$ $= \lim_{h \rightarrow 0} (-6x-3h)$ $= -6x$	✓ $f(x+h)$ ✓ vervanging ✓ faktore ✓ vereenvoudig ✓ antwoord	(5)
8.2	8.2.1 $f(x) = 2x^4 - 3x + a^2$ $f'(x) = 8x^3 - 3$	✓ $8x^3$ ✓ -3 ✓ 0 (geïmpliseer)	(3)
	8.2.2 $D_x \left[\frac{2x^3 - \sqrt{x}}{x} \right]$ $D_x \left[2x^2 - x^{-\frac{1}{2}} \right]$	✓ $D_x \left[2x^2 - x^{-\frac{1}{2}} \right]$ ✓ $4x$ ✓ $\frac{1}{2}x^{-\frac{3}{2}}$	(3)

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	$= 4x + \frac{1}{2}x^{-\frac{3}{2}}$	
8.3	$y = mx + c$ $y = 7x + c$ $5 = 7(4) + c$ $c = -23$ $y = 7x - 23$ OR $y - 5 = 7(x - 4)$ $y - 5 = 7x - 28$ $y = 7x - 23$	✓ gradiënt ✓ subt ✓ vergelyking

(3)

VRAAG 9		
9.1	$f(x) = 2x^3 + px^2 + qx + 3$ N(2;-9) $-9 = 2(2)^3 + p(2)^2 + q(2) + 3$ $-9 = 16 + 4p + 2q + 3$ $-28 = 4p + 2q \dots\dots\textcircled{1}$ $f'(x) = 6x^2 + 2px + q$ $0 = 6(2)^2 + 2p(2) + q$ $0 = 24 + 4p + q$ $-24 = 4p + q \dots\dots\textcircled{2}$ Vergelyking $\textcircled{1} - \textcircled{2}$ $\therefore -4 = q$ $-24 = 4p - 4$ $4p = -20$ $p = -5$	✓ sub in f ✓ $f(x) = 0$ ✓ sub in f' ✓ oplos vir q ✓ oplos vir p
		(5)
9.2	G(0;3)	✓ y-waarde 3 ✓ x-waarde 0
		(2)
9.3	$f(x) = 2x^3 - 5x^2 - 4x + 3$ $0 = (x - 3)(2x^2 + x - 1)$ $0 = (x - 3)(2x - 1)(x + 1)$ $x = 3$ or $x = \frac{1}{2}$ or $x = -1$ AB = 1,5 eenhede	✓ $(2x^2 + x - 1)$ ✓ faktore ✓ wortels ✓ 1,5
		(4)
9.4	$f'(x) = 6x^2 - 10x - 4$ $0 = 3x^2 - 5x - 2$ $(3x + 1)(x - 2) = 0$ $x = -\frac{1}{3}$	✓ $f'(x)$ ✓ faktore ✓ x-waarde
		(3)
9.5	$f''(x) = 12x - 10$ $0 = 12x - 10$ $x = \frac{10}{12} = \frac{5}{6}$	✓ f'' ✓ $= 0$ ✓ $\frac{5}{6}$
		(3)
9.6	$f'' > 0$ $6x - 5 > 0$ $x > \frac{5}{6}$	✓ $x > \frac{5}{6}$
		(1)
9.7	$x < -1$ of $-\frac{1}{3} < x < \frac{1}{2}$ of $2 < x < 3$	✓ $x < -1$ ✓ $-\frac{1}{3} < x < \frac{1}{2}$ ✓ $2 < x < 3$
		(3)
		[21]

VRAAG 10

10.1	10.1.1	$P(S \text{ en } T) = \frac{1}{6}$ $P(\text{nie } S) = \frac{3}{4}$ $P(S) = \frac{1}{4}$ $P(S \text{ en } T) = P(S) \times P(T)$ $\frac{1}{6} = \frac{1}{4} \times P(T)$ $P(T) = \frac{2}{3}$	✓ $P(S)$ ✓ subst in formule ✓ $P(T)$	(3)
	10.1.2	$P(S \text{ of } T) = P(S) + P(T) - P(S \text{ en } T)$ $P(S \text{ of } T) = \frac{1}{4} + \frac{2}{3} - \frac{1}{6}$ $P(S \text{ of } T) = \frac{3}{4}$	✓ sub in formule ✓ antwoord	(2)
	10.2.1		✓ Tak B of C 30% en 65% ✓ Tak B of C 30% en 70% ✓ uitkomst	(3)
10.2	10.2.2	$P(\text{dieselfde maaltyd}) = (0,35)(0,30) + (0,65)(0,70)$ $P(\text{dieselfde maaltyd}) = 0,105 + 0,455 = 0,56$ $\text{Aantal mense} = 200 \times 0,56 = 112$	✓ $(0,35)(0,30) + (0,65)(0,7)$ ✓ 0,56 ✓ 112	(3)

[11]

TOTAAL: 150